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FERTILIZER FOR POTATOES

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There is no best fertilizer for potatoes. The factors of soil, climate, variety and cultural practice all have an effect on determining correct fertilizer practice: the results obtained under one set of conditions may not apply to the same crop when grown under a different set of conditions. It is necessary, therefore, to know something of the conditions surrounding a fertilizer experiment before an opinion can be formed as to the probable application of those results to a given locality.

The results reported here were obtained at the Long Island Vegetable Research Farm under conditions of soil, climate and cultural practices very similar to those prevailing in much of the potato growing area in that section. The climate of Long Island is characterized by a long growing season, mild winters, cool springs, fairly abundant and usually well-distributed rainfalls, and considerable humidity. Except for occasional brief periods, summer temperatures are not high. Fall temperatures are moderated by the surrounding waters so the growing season continues well toward the beginning of winter.

The physical condition of a soil is well suited to growing potatoes. The soil over a large part of the potato producing area is classed as Sassafras silt loam. The plots of the experiment reported here are located on this type of soil. Little or no rotation of crops is practiced in this section. Potatoes are the main crop and occupy the same land year after year. Very little manure is produced on the potato farms and the little that is produced is usually applied to cauliflower rather than to potatoes. Cover crops are almost invariably planted soon after the crop of late potatoes is harvested. Rye is used extensively for this purpose but winter wheat, oats, barley and various mixtures are also used to some extent. The early spring plowing and planting limit the cover crops to those that can make a satisfactory growth between the time of digging the potatoes and the coming of winter weather.

The plots on which this fertilizer experiment was conducted were laid out in 1923. The fertilizer application for any given plot has been the same in each of the eleven years. The cumulative effects of a given treatment have therefore had some opportunity to become evident. There are eighty eight plots, each forty eight and one half feet long and twenty feet wide. The plots are separated by aisles four feet wide. No fertilizer is applied in these aisles but they are planted with the same crop as is being grown on the plots. Every third plot, thirty two out of the eighty eight, is a check plot and is fertilized at the rate of sixty pounds of nitrogen, one hundred fifteen pounds of phosphoric acid and sixty pounds of potash (K_2O)per acre. Nitrogen is applied to various plots at rates of thirty, sixty and ninety pounds per acre, supplemented in each instance with phosphoric acid at the rate of one hundred fifteen pounds per acre and potash at the rate of sixty pounds per acre. Some plots receive only the phosphoric acid and potash. Phosphoric acid in superphosphate is applied at the rates of fifty eight, one hundred fifteen and one hundred seventy three pounds per acre supplemented in each instance with nitrogen and with potash each at the rate of sixty pounds per acre. Some plots receive only the nitrogen and potash. Potash in muriate is applied at the rates of thirty, sixty and ninety pounds per acre supplemented in each instance with nitrogen at the rate of sixty pounds per acre and phosphoric acid at the rate of one hundred fifteen pounds per acre. There are also plots which receive only the nitrogen and phosphoric acid and no potash.

Certified Green Mountain potatoes have been planted on these plots in 1928, 1930, 1932, and 1933 and on a similar series of plots in 1931. The grading into marketable potatoes has been done over a mechanical grader with circular openings one and seven eighths inches in diameter.

The results obtained in these five years shown in table 1, indicate

TABLE 1.—*Effects of various applications of nitrogen on the yields of Green Mountain potatoes*

Year	P_2K_2 (no N) Bu. per acre		$N_1P_2K_2$ (30 lbs. N) Bu. per acre		$N_2P_2K_2$ (60 lbs. N) Bu. per acre		$N_3P_2K_2$ (90 lbs. N) Bu. per acre	
	Total	Market	Total	Market	Total	Market	Total	Market
1928	168	142	184	153	207	175	202	167
1930	135	108	166	136	187	157	180	149
1931	115	85	177	140	238	182	255	208
1932	186	122	206	137	230	154	210	133
*1933	122	63	206	139	231	160	228	150
Av.	125	104	188	141	219	166	215	161

*In 1933 P_2K_2 was changed to P_3K_2.

that on this soil no significant difference in yield was obtained by increasing the annual application of nitrogen from 60 pounds per acre to 90 pounds per acre. Decreasing the rate of application from 60 pounds of nitrogen per acre annually to 30 pounds per acre annually decreased the average annual yield of marketable potatoes by approximately 25 bushels per acre. The odds that this difference is significant are 150:1.

An annual application of phosphoric acid at the rate of 173 pounds per acre produced no greater average yield of marketable potatoes than was produced by an annual application at the rate of 115 pounds per acre. These results are shown in table 2. Reducing the annual application of phosphoric acid from 115 pounds per acre to 58 pounds per acre lowered the average annual yield of marketable poatoes from 168 bushels per acre to 149 bushels. The odds are 29.5:1 that this is a significant difference.

TABLE 2.—*Effects of various applications of phosphorus on the yields of Green Mountain potatoes*

Year	N_2K_2 (no phos.) Bu. per acre Total	Market	$N_2P_1K_2$ (58 lbs. phos.) Bu. per acre Total	Market	$N_2P_2K_2$ (115 lbs. phos.) Bu. per acre Total	Market	$N_2P_3K_2$ (173 lbs. phos.) Bu. per acre Total	Market
1928	182	139	170	139	207	175	174	143
1930	145	105	173	137	187	157	191	159
1931	159	119	225	183	238	196	246	203
1932	164	81	211	134	230	154	233	162
*1933	194	116	234	154	232	158	228	150
Av.	169	112	203	149	219	168	214	163

*In 1933 N_2K_2 was changed to N_2K_3.

It will be seen from table 3 that no greater yield of marketable

TABLE 3.—*Effects of various applications of potash on the yields of Green Mountain potatoes*

Year	N_2P_2 (no potash) Bu. per acre Total	Market	$N_2P_2K_1$ (30 lbs. potash) Bu. per acre Total	Market	$N_2P_2K_2$ (60 lbs. potash) Bu. per acre Total	Market	$N_2P_2K_3$ (90 lbs. potash) Bu. per acre Total	Market
1928	195	163	217	188	207	175	206	178
1930	153	125	176	150	187	157	181	154
1931	207	170	250	203	238	196	228	185
1932	147	65	190	112	230	154	231	159
*1933	115	43	187	111	234	154	228	150
Av.	163	113	204	153	219	167	215	165

*In 1933 N_2P_2 was changed to N_2P_3 in each instance.

potatoes was obtained by increasing the annual application of potash from 60 to 90 pounds per acre. Decreasing the annual application of potash from 60 pounds to 30 pounds per acre reduced the average annual yield of marketable potatoes from 167 bushels to 153 bushels per acre. The odds are 134:1 that this difference is significant.

SOIL TREATMENT IN THE CONTROL OF CERTAIN SOIL-BORNE DISEASES OF POTATOES

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The uncertainty of the several methods of seed treatment, to adequately control common scab of potato, *Actinomyces scabies* (Thaxt.) Gussow, and black scurf, *Rhizoctonia solani* Kuhn., has led the authors to search for more effective means of combating these diseases. Trials begun in 1928 to determine the value of a number of chemical compounds as soil fungicides have shown that mercuric or mercurous chloride applied in dry form at the rate of 10 to 15 pounds per acre (directly in the row) can be depended upon to control common scab and black scurf of the potato in heavily infested soils. Diatomaceous and other earths were employed as diluents to facilitate application and insure a uniform distribution of the fungicides in the soil. The chemicals were mixed in the proportion of 1 part active material to 4 parts of inert substance. Applications made in combination with the fertilizer were not so effective as when the chemicals were introduced into the soil alone or with diluents. Repeated tests have demonstrated that the efficiency of this type of treatment depends largely upon the uniformity with which the space to be occupied by the tubers or roots is impregnated with the fungicidal agent. Mechanical devices for efficiently and conveniently applying these fungicides have been devised and tested. The fungicides caused a slight reduction in the yield in the treated plots. Laboratory and field tests showed that 3 times the amount of mercuric and mercurous chlorides necessary for efficient control of common scab and black scurf were not deleterious to the growth of wheat, oats, barley, clover and timothy. Also, the useful activities of certain nitrogen-fixing organisms *Rhizobium leguminosarum* Frank, and *Clostridium butyricum* Prazmowski, were not affected by the concentrations of mercuric and mercurous chloride necessary

for the control of the diseases tested. For an assumed yield of 300 bushels of potatoes per acre, the cost of treatment was approximately 3 cents a bushel. It is anticipated that the cost of the chemicals will be materially reduced when they are utilized in larger amounts. While these trials were confined mainly to the control of common scab and black scurf of the potato, evidence was obtained that these treatments are also capable of preventing club root of turnips, and certain damping off diseases of ornamentals. A number of other compounds were tested as soil fungicides. Most of these effected little or no control of the diseases tested excepting red copper oxide which offered some promise as a control for club root of turnips. In addition, soil treatment with sodium tetraborate at the rate of 10 pounds to the acre (directly in the row) was found to control a serious condition in turnips known as brown heart.—(Abstract).

RESULTS OF EXPERIMENTAL WORK WITH WIREWORMS

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There are at least four species of wireworms which are recorded as feeding on potato tubers in New York State. Of these, the wheat wireworm (*Agriotes mancus* Say) is by far the most important both from the standpoint of numbers and distribution. About ninety percent of all the wireworm injury to tubers may be ascribed to this species and the losses occur in all the principal potato growing regions of the state. A series of investigations, started in 1930 have resulted in findings of interest to both growers and investigators.

The injuries to potatoes caused by wireworms are of several types, depending on the size of the larva attacking the tuber and the stage of development of the tuber when attacked. The appearance of the feeding holes may be greatly modified by rhizoctonia or other diseases which may follow wireworm injury or by the subsequent growth of the tuber. When larger wireworms attack potato tubers late in the season a clean-cut round hole is eaten rather deeply into the tuber and is not likely to be confused with any other type of injury. Rhizoctonia develops in such a wound and the burrow becomes surrounded and partly filled with corky, dead tissue. When young and small wireworms attack tubers, they make smaller burrows. Rhizoctonia may gain entrance and the cavity may be completely filled with dead tissue so that the original feeding hole is no longer visible. If wireworm

injury occurs early in the development of the potato tuber subsequent growth may produce open, rough cracks similar in some respects to growth cracks but commonly more numerous on the particular tubers attacked.

Several experiments using a variety of insecticides in different ways demonstrated that any such method of attack offered little or no promise of practical commercial control. Arsenates, fluosilicates, cyanides, mercurials, naphthalene and other soil fungiments were tested both in the laboratory and in field experiments with little or no success. Some of the materials were extremely toxic but the cost of efficient dosages was prohibitive and proper distribution of materials in the soil presented important practical difficulties. An intensive and detailed study of the insects, stressing habits and environmental responses as well as seasonal activities seemed to offer possibilities of checking the many rumors regarding cultural measures as the means of control.

Considerable confusion has existed as to the life history and development of wireworms. As a result conflicting opinions regarding the relationships of farm rotations to wireworm infestations have been prevalent. Under the conditions of western New York beetles emerge early in May and are present in fields until early July. On two occasions mass flights have occurred but this is apparently exceptional. They ordinarily fly but little although capable of sustained and rapid flight. Eggs are laid for the most part during late May and early June. Eggs hatch in about three or four weeks and the young larvae feed but little before going down six or eight inches in the soil to overwinter. Feeding starts again in early spring of the second year and continues until late fall. It is the extensive feeding of these second-year larvae which causes the most severe injury to potato tubers. A second winter is spent in the soil and some little feeding is done the following spring. The larvae become full grown and start pupating in July. Beetles appear in the earthen pupal cells during August and September but relatively few if any adults emerge in the fall. Not all of the individuals from eggs laid at the same time will complete their development in three years. In some cases four and even five years may elapse before growth is completed. As a result there are always sufficient numbers of beetles present every spring to reinfest fields.

The wheat wireworm in any stage is sensitive to desiccation although the insects can withstand extremes of temperature. Beetles or larvae in excessively moist or dry situations live for only a very

few hours. They are most commonly found in cool, moist localities, such as the crowns of grass or grain plants, under stones or in cracks in the soil. Several attempts to infest cultivated land by placing beetles in cheesecloth cages resulted in the death of all adults and no young larvae were obtained. These facts, obtained through laboratory and field studies led to the establishment of some experiments with rotations as a possible means of preventing wireworm infestations in potato fields.

In sampling for wireworm populations a section of soil three feet square and six inches deep was removed, sifted and the wireworms counted. Comparable numbers of samples are presented in every case.

Table 1 presents the results of tests in which strips of sod were

TABLE 1.—*The effects of sod crops compared with cultivated land on the abundance of wireworms*

Field	Crop	Number of Replications	Number of Samples	Number of First Year Larvae	Population per acre
1	Sod	4	29	139	52,272
	Cultivated	4	29	1	327
2	Sod	3	18	65	39,204
	Cultivated	3	18	0	0
3	Sod	4	20	109	60,984
	Cultivated	4	20	3	1,612
4	Sod	2	20	182	100,188
	Cultivated	2	20	2	1,089
5	Sod	2	26	91	50,529
	Cultivated	2	13	0	0
6	Sod	2	12	234	284,447
	Cultivated	2	8	14	25,700
Total 6	Sod	17	125	820	97,937
	Cultivated	17	108	20	4,621

plowed before egg deposition started as compared with unplowed strips in the same fields. There can be little doubt as to the effects of removing sod on the resulting wireworm infestations in these fields. In field 6, plowing was delayed somewhat and a few eggs were laid before the strips were broken up.

TABLE 2.—*Cultivation of large infested areas as affecting reinfestation of those areas*

Year	Crop	Number of Samples	Wireworm Population		
			Beetles	Mature and Second Year Larvae	First Year Larvae
1930	Sod	13			
1931	Potatoes	13	1	88	0
1932	Potatoes	13	42	23	0
1933	Potatoes	39	36	18	1
1930	Sod				
1931	Potatoes				
1932	Potatoes				
1933	Grain	17	7	4	0
1929	Sod				
1930	Potatoes	13	1	119	0
1931	Potatoes	13	19	83	0
1932	Grain	13	10	17	0
1933	Grain	20	0	3	0
1929	Sod				
1930	Potatoes	13	1	102	0
1931	Grain	26	33	41	0
1932	Sod	23	6	8	107

The question arose as to whether or not the same results would be obtained if whole fields were plowed up instead of strips. Table 2 shows the results obtained in four fields, three of which were kept free from cover during the egg laying period and the fourth continued in the usual rotation. The effectiveness of removing sod, even on a large scale is apparent. In table 3 the trend of wireworm injuries in fields subjected to continuous cultivation is clearly depicted.

TABLE 3.—*The trend of wireworm injury to potato tubers following elimination of sod*

Field	Year	Crop	Percent Injury to Potato Tubers
1	1929	Sod	
	1930	Potatoes	92.0
	1931	Potatoes	17.7
	1932	Grain	....
	1933	Potatoes	.035
2	1930	Sod	
	1931	Potatoes	85.0
	1932	Potatoes	4.0
	1933	Potatoes	.75

The cumulative populations of wireworms in fields left in sod for two consecutive years are shown in table 4. Considering all fields the population about doubled as a result of the second year of sod.

TABLE 4.—*Incidence of infestation of fields in sod for two consecutive years as measured by first year larvae*

Field Number	Total Number Samples	Number of (First Year) Larvae Found in Sod	
		First Year Sod	Second Year Sod
1	6	57	87
2	8	153	46
3	20	58	81
4	10	92	89
Totals 4	44	360	303

Infestations of the wheat wireworm (*A.mancus* Say) start in fields which afford abundant protection to beetles from desiccation. Under the farm rotation system most common in western New York this protection is afforded by, and eggs are deposited in, hay or sod fields. The elimination of cover in fields to be planted to potatoes, from the middle of May to the middle of June, has reduced wireworm populations and eliminated injuries to potato tubers. Since some beetles will emerge every spring potato land must be kept free from cover every year to avoid reinfestation. The best method of attaining this end is an individual problem. The exact cropping system to be employed is a matter of far reaching importance which can best be determined through consultation of individual growers with authoritative sources of information.

GROWING SEED POTATOES UNDER AN ASTER CLOTH CAGE

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During the summer of 1933, part of a Green Mountain tuber clone was grown under an aster-cloth cage on Highmoor Farm, in southwestern Maine. The increase in the cost of growing potatoes due to the cage, and the reasons for attempting such a thing, will be given for the benefit of other experimenters.

On Highmoor Farm several tuber lines or clones were originated in

1927 as isolated tuber units. These were increased as long as they remained healthy but by 1929 all but one had become slightly leafroll or slightly mosaic or both in spite of isolation from other potatoes by several hundred feet. This remaining clone "followed suit" in 1930 but was still free of spindle tuber. In this clone, seed that was saved in 1930, from plants grown several hundred feet distant from spindle-tuber stock, was slightly spindle-tuber in 1931.

A new attempt was begun in 1930 with several more tuber units. Isolation of the healthy increase plots in 1931 by about half a mile did not prevent leafroll from appearing in about 2 per cent of the hills of two clones in 1932, a year when they were still better isolated. Another clone in 1931 acquired a little leafroll and also spindle tuber and yellow top, in spite of isolation of about one-third mile (4). In 1932 the first two clones acquired yellow top though isolated a quarter-mile from any potatoes with this disease, while the third acquired mosaic though isolated a half-mile from mosaic potatoes.

The preceding experiences had convinced the writer that this was no place in which to maintain seed potatoes healthy in the open. Due to the size of the experimental farm (275 acres) and the use of healthy stocks by neighboring farmers, isolation appeared to be better than is possible on most farms. The results were not as encouraging as those reported by Kotila (8—9) in northern Michigan with isolations of one-quarter to one-half mile.

In central Maine, observations of farmers' stocks indicated that mosaic and leafroll in 1931 spread to healthy Green Mountain seed plots over distances of a half-mile or possibly even a mile (4).

In all these instances of apparent spread of virus diseases to seed plots which were hundreds or thousands of feet distant from other potatoes, it seemed possible that disease was introduced by plant lice early in one season without showing until the next season. (Such has been done in experiments in small cages, where the larger the plant, the more aphids of a given species were required to infect (3)). This idea could be tested further it was thought, through keeping migrating and dispersing plant lice off a seed plot at least during the first part of the season. For such protection an aster cloth cage was suggested by publications of Post (10) and Jones and Riker (7).

In case a large cloth cage over a healthy seed plot thus should prevent infection, the healthy seed so obtained could be used in some untested region to determine the effect of different degrees of isolation there. Incidentally, no matter what the outcome of the test, the healthy

seed should be of use, to the growers securing it, for a year longer than stock containing some disease when obtained by them.

It is not expected that potato growers can afford to use large cloth cages as can aster growers and tobacco growers.

The construction of a cage in Maine in 1933 followed closely the printed plans supplied by the Windsor Company of Windsor, Connecticut, and of Concord, North Carolina. This company sells cloth in 400-inch (about 33-foot) widths for cage tops and in 6-foot widths for cage walls. The cloth is a coarse unbleached cheesecloth with frequent strengthening bands of closely woven threads. A similar cloth, either untreated or chemically treated to retard deterioration, is sold by Kendall Mills of Walpole, Massachusetts.

Our experience in 1933 was with two cages, covering 32 and 4 square rods respectively. However, permanent equipment and materials for these were about sufficient for making one cage to cover 48 square rods or 0.3 acre (66x198 ft.). For such a cage our experience indicates that approximately the following expenses would have been necessary.

Total cost *first year* ($240).	
Permanent special cage equipment and materials	$50
Labor on same	50
Materials consumed each season	90
Labor on same	50
	$240
Total cost *second year* ($140)	
Materials consumed each season	$90
Labor on same	50
	$140

Total cost *third, fourth,* and *fifth* years, same as second.
Cost three years, total $520, average about $170.
Cost five years, total $800, average about $160.

Note: To buy certain permanent equipment usually available on a farm would cost $30.

The details of these costs, involving some dozens of different kinds of items, will be gladly supplied, upon request, by the author.

Some notes and precautions should be given. (1) Land, additional to the 0.3 acre inside the cage, will be needed for the guy wires from posts to anchor sticks. (2) In selecting land for the cage, shelter should be given due consideration whenever possible. A wind-break of woods, buildings, or even a high pitch of ground, that does not interfere with good drainage and other necessary soil requirements for

good potato raising, would be very helpful in cage construction and would no doubt add several weeks to the life of the cloth. (3) In some regions and localities considerable attention should be paid to location of prospective post holes and anchor sticks, testing with a bar, before making a final decision as to cage location. Otherwise too much blasting might have to be done before posts and dead men can be set at the proper depth. (4) Even white cedar posts will benefit from carbolineum paint (11). (5) The wires running lengthwise of the cage should be very tight so that the cloth will not pull them to one side. (6) The first breaks in the cloth were from chafing—hence the necessity of adhesive tape, weeding around the cage, and nailing the laths exactly even with the top of the planks. (7) Aster cloth style No. 42 is preferable to ordinary aster cloth, as it contains more closely woven strengthening bands. (8) The wind can easily be too strong for the job of putting on the cloth. (9) For discouraging the entrance of curious humans, the door can consist of an end of the wall cloth nailed shut to a post. (10) The removal of the end planks permits the use of horse-drawn machinery in harrowing, planting, digging, and plowing.

Our results in 1933 were mostly favorable. Roguing was finished by July 13. Plant lice (both spinach and potato species) were found in an open field to the number of 122 per 50 leaves on July 24, while none were found on 50 leaves inside a cage near the field. Due to lack of precautions, chafing caused some holes in the cloth by August 1, and on August 9 inside the cages there were 3 aphids (a colony of one winged and two young individuals) on 50 leaves, and these aphids were near a large rip in the sidewall. As it happened, no roguing was necessary in the stock in the cages. It is hoped that, through the cage method, we can plant a disease-free 3-acre field in 1934 and each year afterwards. This field should provide seed for a number of disease-free seed plots inasmuch as in 1933 about ten acres (of a total of 16 acres) were mosaic-free that were planted from seed developed without cages.

It may be remarked that the yield rate under cloth was 140 barrels (385 bushels) an acre, being about the same as in the open field. The cloth had about 21 meshes to the inch and cast some shade, of course, but not enough to change the appearance of the plants as do the heavy-cloth small cages of insect-transmission experiments. Relative humidity was found to be the same inside the cages as outside (1) but at the same relative humidity there probably is a somewhat slower rate of transpiration there due to reduction in wind velocity (1). Damaging of cloth cages by wind, hail, fire, and lightning is described by Clinton

(2). The loss of strength by the cloth, due largely to exposure to sunlight (5), can be reduced by impregnation with lead chromate (6).

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DEVELOPMENTS IN THE MARKETING OF THE OHIO POTATO CROP

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The potato, beginning with the early history of our agriculture to the present day, is one of the most important cash crops on Ohio farms. Records of the crop are available from 1866 when 57,000 acres were planted. The acreage gradually increased until the peak of slightly over 200,000 acres was reached in 1909. The per capita production in Ohio over this same period of time equaled that of the United States, which was a little over three bushels. When the per capita production was over three bushels, the state produced all the potatoes it consumed. The rapid development of industry in Ohio meant a rapid increase in population and the building of many cities. Potato production increased with the population until the beginning of the decline of acreage in 1910. In this year the acreage in Ohio started downward, reaching the low point of 100,000 acres in 1926. While the per

capita production of the United States had increased to about 3½ bushels in the ten year period, 1920-29, the per capita production of Ohio fell to 1.75 bushels. This reduction took place during a period of high-price years. In the past few years the acreage has not fluctuated much and there seems to be no tendency to materially increase it.

The early history of the potato found our production centered along the Ohio River for the mining areas and for bulk movement down the river, some boats going as far south as New Orleans. Elsewhere in the state, production was centered around the industrial areas to supply the large urban population. As the demand increased for the more perishable vegetables, the latter displaced much of the potato acreage around the larger cities. Shipping areas in southern and northern states developed with transportation facilities. These areas found industrial Ohio a good market outlet. Their higher average yields made real competition for the Ohio grower even though freight rates were high.

The southern part of the state produces early potatoes, while production in the northern section is mainly late, with a few scattered early areas. The predominate varieties are Cobblers for the early and Russets for the late crop. The early crop in southern Ohio starts to move to the market in early July and digging is usually completed in early August when the early crop in northern Ohio is ready. Digging of the late crop starts in September and is completed in October. The average crop in Ohio for the five-year period, 1928-32, was about 10,500,000 bushels of which the late crop makes up 7 to 8 million bushels.

Marketing conditions have changed in the last few years. Consumers formerly bought their winter's supply of potatoes in the fall and stored them. Now they buy from week to week. Old line commission merchants were about the only marketing agents. Some speculators bought in the fall and stored potatoes. Terminal market commission men have done little speculating with the crop the last few years. Large buyers representing chain store organizations and truck peddlers, have become a factor in our marketing scheme. The chain buyers want potatoes in large quantities and individual growers with comparatively small crops have found it difficult to sell to them; hence, the trucker has played an important role in our Ohio marketing the past few years. Few Ohio farmers have ample storage for their crop. Therefore, they have to move their potatoes before cold weather sets in. The truckers take full advantage of this situation by beating down the price.

A standardization bill was passed by the Legislature this past year

and became effective September 15, 1933. The pertinent points of the law are: That every person, firm, corporation, organization, or distributor who, by themselves or by their agents or employees, pack or repack fresh fruits, vegetables, or honey in containers, or transports, common carriers excepted, consigns, delivers or offers the same for sale, either privately or in the open market, shall cause such containers to be marked in a plain and indelible manner as follows:

1. With their full name and address, including the name of the state where such commodities are grown or packed or if the commodity is repacked the state of origin must be shown, regardless of the size or type of container.

2. The net contents by weight, or numerical count if not in a standard container built in accordance with the specifications of the federal standard container act, in which case the cubical contents are sufficient.

3. The grade in accordance with the standards established by the state of Ohio, except commodities covered under the terms of this act may be offered for sale in an ungraded condition or graded according to individual standards, providing the term "ungraded" or "growers grade" is marked conspicuously on each package or on each tag or label used on each package. The grade designation terms used in the standards adopted for Ohio shall not be used in connection with the words "growers grade" and all markings on the package, tag or label shall be in letters of legible size.

The passage of this law added stimulus to developing of a marketing program for Ohio.

A statewide meeting of potato producers and buyers was called in September. The purpose of the meeting was to discuss the problems involved in the marketing of the Ohio potato crop with the hope of developing means for the orderly disposition of that crop. This meeting authorized the appointment of a committee to proceed with the preparation of plans for a marketing program, the proposed program to be submitted as early as possible to all counties in the state in which potato production is important. In the preparation of its plans, the committee was instructed to confer with representative dealers in order that the cooperation of the buyers may be secured in-so-far as possible.

The committee met in early October. In its deliberations, the committee considered the following factors as being significant in the marketing of Ohio's potato crop:

1. The acreage planted to potatoes in Ohio has averaged approximately 110,000 acres in the five years, 1928-1932.

2. Production during the same years averaged about 10,500,000 bushels annually.

3. Value of the crop to growers during the same years averaged about $9,000,000 annually.

4. Average yield during the same period was about 96 bushels per acre.

5. The commercial crop in this state is produced mainly by about 3,000 growers.

6. There are 34 counties in Ohio each producing over 100,000 bushels annually.

7. Not over 100 commercial potato farms in Ohio have suitable frost-proof storage for their own crops.

8. Each producer sells his own crop; there is practically no co-operative merchandising of potatoes in Ohio.

9. Ohio is a deficit area in potato production. About 20,000,000 bushels are consumed in the state each year, one-half of which are shipped in from other districts. These 10,000,000 bushels come mainly from the following states:

Early—Florida, Texas and Alabama; mid-season—North Carolina, Virginia and New Jersey; late—New York, Michigan, Maine, Minnesota, North Dakota, Wisconsin and Idaho.

The committee considered the following elements of the problem to be of primary importance:

1. Inadequate storage facilities and inability to obtain credit on the crop, result in the major part of the crop being rushed to market during a brief period at harvest time.

2. Widespread selling competition between individuals; many of whom are unskilled, poorly informed or weak bargainers. No centralized control over shipments or sales.

3. Lack of uniformly high standards of grade and pack.

4. No coordination between marketing of the Ohio crop and that of other states.

The committee recommended, therefore, that efforts to stabilize the marketing of Ohio-grown potatoes be directed along the lines indicated above and proposed the problem be attacked by:

1. Providing for collection and dissemination of current information on prices and on supplies moving and available.

2. Encouraging sales only through those marketing agencies whose ability and integrity have been proved.

3. Establishing county or area cooperatitve marketing units in districts where justified by volume of production. These units should

provide facilities for grading, packing, sorting, financing and selling for local members.

4. Forming a centralized agency for the entire State of Ohio to exercise control over shipments and sales.

5. Joining with other important potato-producing states in the formation of a national potato board for the purpose of co-ordinating supply with demand through control over planting and shipments, and to exert a stabilizing influence on prices.

Although the committee approved this program as a whole, it doubted the advisability of attempting to secure the immediate or simultaneous adoption of all its phases. It is believed that a greater degree of success may be attained through the consecutive adoption of the foregoing proposals in the order given. It was suggested that only the first and second phases be stressed at the outset, with some preliminary work being done looking to the establishment of local units prior to the 1934 marketing season.

Work was immediately started on the first of these five points. Key growers were selected in the important potato counties to furnish information on farm supplies and prices. This information along with terminal quotations, carlot shipments, etc., are combined and broadcast over three broadcasting stations. Several counties have organized potato associations to assist in the work outlined.

Many reports have come in from growers saying that these broadcasts have done much to prevent price cutting which usually demoralizes our market. The committee is now working on the second and third phases of the recommended solutions.

Recognition should be given to the committee consisting of Henry Leimbach, Barnett Graham, A. L. Smith, E. H. Borton, V. O. Hutchinson, Samuel Studebaker, W. E. Stough and Charles W. Hauck, Marketing Specialist, Ohio Agricultural Experiment Station for their fine cooperation in this work.

SECTIONAL NOTES

NEW JERSEY

Planting will be delayed somewhat this year due to the unusually late spring. Some growers are already disinfecting their seed so as to be ready to plant as soon as conditions permit. Definite information on the number of acres to be planted is not yet available but leading dealers and growers predict an increase of approximately 15 per cent over last year. There are some reports of frozen seed in storage cellars. It is impossible to obtain definite information on the extent of

the damage, but some growers are reported to have lost appreciable amounts of seed. Northern grown seed potatoes are now being sold to the grower for $4.75 per 150 pounds.

Dealers' and Growers' Committees have been working on marketing plans for this year's crop. Considerable progress has been made and there is little doubt but that the New Jersey crop will be sold by an organization similar to that in operation in 1933. Under this plan, all potatoes will be sold from one office. It now appears that all the established dealers will operate from this office and, through the operation of a quotation committee composed of growers and dealers, only one price will be quoted from this section. This committee will also be charged with the regulation of digging operations in order to prevent excessive loadings. As was true last year, the growers will refuse to sell to any dealer or trucker not represented in the central office. This plan proved to be a big influence in stabilizing prices in 1933 despite the fact that several dealers operated independently. Some of these dealers have indicated that they will join the movement this year so that, with all dealers operating together, the marketing plan should be even more successful than was the case in 1933.—Wm. H. Martin.

NORTH DAKOTA

The official North Dakota State Potato Show, held at Park River on March 1, 2, and 3, attracted people from all parts of the State with a reported attendance at all meetings of 6,300. Winners in the various varieties were as follows: First place, Bliss Triumphs, M. S. Swanson, Nash; Second place, Irish Cobblers, Harris & Robbie, Cavalier; Third place, Early Ohios, Jens Knoff, Hoople; First place in the utility class, Viking, H. M. Hanson, Grafton. The Grand Champion cup was awarded to M. S. Swanson, Nash, for his thirty tuber exhibit of Bliss Triumphs. There were 152 exhibits in the show which was judged by E. M. Gillig, State Seed Commissioner.

The Annual business meeting of the North Dakota Potato Growers' Association was held at the same time with the following officers and directors elected: President, Oscar Hagen, Watford City; Vice president, P. J. Flaten, Nash, and Secretary-Treasurer, E. J. Taintor, Park River.

Directors elected for the next two years include M. S. Stenehjem, Arnegard; A. B. Thompson, Grafton; J. E. Bagstad, Hillsboro; J. J. Hoehn, Epping. The various matters of importance to the potato industry in North Dakota including a code for North Dakota Potato

Growers were discussed at the banquet meeting of the Association and also at a separate meeting of the Board of Directors.—E. J. TAINTOR.

ALABAMA

Reports from the Gulf Coast area of Alabama indicate a rather heavy planting of Irish potato acreage which has been delayed 10 to 15 days due to rains and cold. Liberal applications of fertilizer were made to the crop this year.

Baldwin County will plant 132 cars of seed potatoes as contrasted with 88 cars for 1933. This will mean approximately 8,000 acres in Baldwin County alone, assuming 60 acres to be planted from each carload of seed. The acreage of the state for this year will probably be around 10,600 acres as compared to 8,000 in 1933 and 10,000 in 1932.

In the Atmore section, there will be about 26 cars planted as compared with 20 for 1933.—L. M. WARE.

LOUISIANA

The potato crop was practically planted by the first of March. The acreage increase is estimated to be about 5 per cent over that of last year. In our main producing parishes in South Louisiana, such as Lafourche and Terrebonne, there has been a tendency to reduce acreage slightly. In North Louisiana, where a number of new sections are producing potatoes this year, the acreage shows a slight increase.

Potato planting started as early as January 15, and weather conditions have been such so far that a good crop is anticipated.

Growers, of course, are looking for a better price than last year, and every effort will be made to get potatoes on the market as early as possible.—B. B. JONES.

SOUTH CAROLINA

It now looks as if our potato acreage will be increased approximately 35 per cent this year. The potato section has had plenty of moisture which has perhaps delayed planting to a certain extent, but I believe that most of the seed was planted by the first of March. With favorable weather during the growing period our shipping season will be about normal. Our acreage will no doubt be increased a little more because of the fact that our spring cabbage crop was practically wiped out. Lack of finances, however, will probably keep our growers from increasing the acreage any more than planted at the present time. —GEORGE E. PRINCE.

FLORIDA

Growing conditions for potatoes in the Hastings, Florida, section, have been good since February 15 and the present indications are that a normal yield will be produced.

Dusting for the control of late blight is now in progress. Very little late blight has appeared and this is confined to fields planted in December. Growers use 20-80 copper lime dust for late blight control. Not over three or four growers in the entire section spray with Bordeaux mixture.

Digging and marketing of Bliss potatoes grown in the Homestead-Goulds section will be completed by March 24. Digging was delayed because of poor marketing conditions prevailing at the Eastern market centers during the extremely cold weather the latter part of February.

Marketing of the 16,000 acres of Spaulding Rose potatoes in Hastings section started the week of February 12 and the bulk of the crop will be marketed during the month of April.—A. H. Eddins.

The south Florida crop, consisting of Bliss Triumph, has pretty largely been harvested. The crop yielded especially well, some growers reporting yields as high as 400 to 425 bushels per acre. One reason for the good yield is the closer spacing which is being used in that area, some of them planting as close as nine (9) inches. Considerable differences were noted regarding seed source, some of the best coming out of the Dakotas and Wyoming.

Shipments are just beginning now in the Bunnell area, which is really part of the Hastings section. These consist of Spaulding Rose, and the early crop has not yielded especially well, about 35 to 40 barrels per acre. Practically all of the shipments of Bliss out of South Florida were made in one-bushel crates, while the barrel is still used in the Hastings area, although it is being replaced somewhat by 100-lb. bags for No. 2's and by crates for some of the No. 1's.

The most important event recently was the freezing temperature on the 10th and 11th of this month. It was colder at LaCrosse than at Hastings, consequently greater damage was inflicted, although the potatoes were young (just about at the stage of tuber formation) at the LaCrosse area.

In Hastings, a good many of the potatoes were of the size of No. 2's and 3's. This will undoubtedly retard the digging period somewhat and undoubtedly reduce the yields, especially in certain fields where the frost was most severe. Up until the time of the frost the prospects were especially good for excellent yields.—M. R. Ensign.

CALIFORNIA

The Stockton Potato Growers' Association was formed in July, 1932, with 31 members and a total of 13,000 acres. We are not incorporated, and we do no selling or price fixing; we are a non-profit organization endeavoring to improve the potato industry of California as set forth in the following objectives:

1. Elimination of number two potatoes when a surplus exists.
2. Regulation of harvesting and shipping to meet consumption demands.
3. To improve and maintain grades.
4. Elimination of destructive or unfair practices throughout the chain of distribution.

Our Association occupies the most unique position in America in that we have this year (1933) only twenty-five members owning and controlling 12,000 acres of potatoes situated in a compact area about 15 miles square in the Delta regions of the San Joaquin and Sacramento rivers. This area is divided into tracts or islands well protected with broad strong levees. Each tract is surrounded by navigable water ways upon which many transportation companies operate a dependable boat service which gives our growers direct transportation to the San Francisco and Los Angeles markets.

Planting begins in March and is completed generally in May; this year one of our large growers started planting his 2600 acres on April 1, planted 110 acres per day and completed his planting before the end of the month.

Digging operations start in June and continue on into March. Nature has provided us with excellent storage facilities at low cost, and in seasons of dull markets, potatoes have remained in the ground until the last of April, but this practice is not desirable.

Our members produced 2,555,000 bags of potatoes (100 lbs.) or 8500 carloads in 1933. These have been moving to market in an orderly manner and at no time has there been a serious oversupply on our two large terminal markets, San Francisco, and Los Angeles, although we have been feeding these two markets all they could absorb. Our plan of pro-rating shipments has worked successfully and has accomplished the purpose for which it was devised; viz, to regulate the flow of the crop to markets. We have been quite successful in keeping the low grade or number two potatoes out of trade channels. Last season we contributed to accredited Welfare and Relief Agencies over 32,000 bags

of potatoes. This season we are not distributing so many because Federal funds are available for the purchase of food supplies, and the Relief Agencies are now buying our better grades.

We have at no time attempted to fix selling prices; in fact our articles of agreement prohibit it. We know of many organizations that have been wrecked by price compelling agreements. Our policy has been to improve our grades and style of package, regulate flow of potatoes so as to avoid glutted markets, keep the low grade, unclassified potatoes out of trade channels, and then allow our product to sell on its merits and seek its own price levels.

We are learning by experience and have discovered many weaknesses in our organization set up. I have my personal views on some phases of organization that I am sure would eliminate much grief and tend to make a more stable system of distribution.

1. Adopt U. S. standard grades so that when a grower delivers a car of potatoes under a Department of Agriculture certificate at a stipulated price, the deal is closed so far as the grower is concerned.
2. F. O. B. Sales: Develop a comprehensive plan to meet our situation and build a more stable sales structure for distributing our potatoes, keeping in mind that we have some members who are both growers and dealers.
3. Grower members shall sell no potatoes direct to produce peddlers, such sales to be handled through licensed dealers. The grower designates the dealer who shall handle the sale and refers the peddler to the dealer who will collect for the potatoes and will give the peddler an order on the grower for the quantity and quality of potatoes as purchased; said dealer to be responsible to the grower for the moneys involved. For this service, the grower shall pay to the dealer 5c per bag (100 lbs.).
4. Invite hearty cooperation from the dealers by giving them an opportunity to make a legitimate profit on our potatoes and use our best efforts to insure them against cut throat competition of peddlers and irresponsible operators.
5. Some comprehensive plan of curtailing plantings on a nation wide scale should be devised. It is folly for one state to reduce her acreage if neighboring states do not likewise reduce.

I believe the potato growers of America have enough intelligence to evolve some plan which will benefit the potato industry and will

also permit the farmer to hold on to his farm and make a decent living for his family. Any contemplated improvement in the potato industry must be conceived in a noble spirit of high thinking, a spirit of unselfishness, and a sincere determination to give a square deal to everyone who takes a part in the production, the distribution, and the consumption of our potato crop.—A. F. ROBERTS.

MARYLAND

We expect that the acreage of early commercial potatoes will be increased by about 16 per cent over the acreage harvested last year. The 1933 acreage was, of course, very small, being estimated at 6,100 acres. The acreage actually planted this year will depend to a large extent upon the market outlook and upon the amount of credit available for the purchase of fertilizers.

We do not expect the farm crop acreage to be any larger than last year. If the early crop, grown for farm consumption, produces about normal yields, the total farm crop acreage should be somewhat smaller than last year, since farmers will not be forced to plant extra late crop acreages to produce sufficient potatoes for home use.—RICHARD C. ROSS.

EASTERN SHORE OF VIRGINIA

The Eastern Shore of Virginia has experienced an unprecedentedly late and cold winter. At this time, March 13th, there is a trace of snow on the ground. Much preparation of the land for potato planting is yet to be done. Only a relatively small portion of the potatoes are planted, at a time when normally the southern half of the Peninsula has almost completed planting.

Weather indications are now better. It is to be expected that planting will take place rapidly in the near future.

The Norfolk area and North Carolina have likewise experienced cold weather and their planting is also later than normal.

Some freezing injury to seed stock has been reported on the Eastern Shore of Virginia. There is no reason to believe this injury to be serious and there is no way of determining what it will amount to at this time.

Reports from North Carolina indicate that a considerable amount of seed stock in the lighter, sandy soil was frozen. It is also reported that seed has been bought to replace a considerable additional acreage.

It is now believed that the acreage on the Eastern Shore of Vir-

ginia will not be increased as much as the nineteen per cent reported by the Government in the previous acreage forecast. A very diligent effort has been made by many agencies furnishing credit or supplies, to prevent an unduly large increase in acreage. It is the general consensus of opinion that the increase in planting will range from six to ten per cent. This additional acreage is largely brought about by bringing back into production land which was not planted last year.—G. S. RALSTON.

THE PRICE SITUATION

The following report on potatoes was released on March 15 by the Bureau of Agricultural Economics of the United States Department of Agriculture.

Potato prices in central markets followed a mixed trend during February; advancing about 63 cents per 100 pounds or 30 per cent in the East, but declined 21 cents or 10 per cent in the Middle West. Both eastern and western market prices eased off during the first week of March. The car-lot movement of old stock has continued heavy during February, although it was somewhat lighter than during February a year ago. Although increased plantings have been made in the southern early states recent frosts caused some damage to the growing plants which may reduce yields slightly.

Potato prices at New York rose steadily through February to a new season high of $2.71 per 100 pounds but eased off to $2.55 during the first week of March. This new peak in prices is 71 cents above the January low, and $1.06 above the November or season's low point. A year ago the quotations averaged $1.13 per 100 pounds. At Chicago potato prices declined 21 cents per 100 pounds from the season's high of $2.13 reached the last week of January to the last week of February and then declined further to $1.82 during the first week of March. A year ago they averaged 98 cents per 100 pounds.

Eastern shipping point prices followed much the same trend as New York prices. At Presque Isle, Maine, Green Mountains advanced steadily throughout February to $2.00 per 100 pounds f. o. b. cash track and then declined slightly during the first week of March. This new high point is exactly double the season's low reached last November. Round whites at Rochester, New York, advanced about 35 cents per 100 pounds during February to $1.96 and then declined to $1.75 during the first week of March. Shipping point prices in the Middle

West and Western States followed the lead of the Chicago market. At Waupaca, Wisconsin, round white prices declined 10 to 15 cents per 100 pounds during February and then another 10 to 15 cents during the first week of March, when they averaged about $1.12 per 100 pounds. At Idaho Falls, russets declined from $1.38 per 100 pounds to $1.20 during February and held fairly steady during the first week of March.

The United States farm price averaged 87.7 cents per bushel on February 15, compared with 77.2 cents a month earlier, 37.0 cents a year earlier and 66.3 cents the 1910-1914 February average. Farm prices are now 7 per cent above their "parity price" of 82 cents per bushel. Shipping point prices of Florida Bliss Triumphs declined from $3.10 per 100 pounds to $2.30 during February. Prices strengthened slightly during the first week of March.

The carlot movement of old stock potatoes continues heavy. Shipments have averaged from 4,100 to 4,900 cars per week during February. To March 3 this year the movement of late potatoes exceeded 114,000 cars compared with 92,000 cars last year to March 4. Even the movement of new potatoes from Florida is heavier than a year ago. Around 550 cars had been moved to March 3 compared with only 241 a year ago.

REVIEW OF RECENT LITERATURE

The Warba—a new early potato, F. A. KRANTZ and A. G. TOLAAS *(Minn. Hort. July-Aug.* (1933), 61; 7, *Pp.* 137). The Warba was produced from a cross of a selected seedling, (No. 4-16) and Bliss Triumph. The new variety has been tested for five years and has uniformly produced a larger crop in a shorter time than any of the other early varieties. It matures ten to fourteen days earlier than the Irish Cobbler and from seven to ten days earlier than the Early Ohio and Bliss Triumph. In addition to earliness, the primary characteristics of the Warba are: upright sturdy vine, high yield, short, round, blocky white tubers with pink eyes, uniform size in hill, few culls, and resistance to mild mosaic.

Symptoms of fertilizer injury to potatoes, JOHN BUSHNELL *(Jour. Amer. Soc. Agron.* 25 (1933), *Pp.* 397-407).—Poor stands of potatoes are very common in Ohio, but whether these are in any part due to improper application of a fertilizer has been an open question. Some hand placement experiments were conducted at the Ohio Experiment Station, on a Volusia silt loam, to determine the nature of fertilizer injury. Three distinct types of injury were found:

1. When the fertilizer was close to, but not in contact with the seed piece, there was a retarded emergence of the plants. The drier the soil, the slower was the emergence.

2. When the fertilizer was in direct contact with the seed piece, not only was sprout growth retarded, but if freshly cut seed were used it rotted where the cut surface came in contact with the fertilizer. Small whole tubers, on the other hand, did not rot, even when completely surrounded by fertilizer.

3. When the fertilizer was applied above the seed piece, the sprouts were killed or stunted, particularly if the soil were dry. With frequent rains after planting the sprouts pushed through the fertilizer without any detectable injury, except retardation of growth.

The soluble fertilizer constituents, such as sulphate of ammonia and muriate of potash, rather than the relatively insoluble superphosphate, were responsible for the injury. As expected, the larger the applications the more serious were the injuries.

Unpublished data, from the machine placement experiments conducted in cooperation with the U. S. Department of Agriculture, agree with the results obtained in New Jersey and elsewhere in that the safe placement of fertilizer is at the side with an inch or more of soil between the seed and the fertilizer.—Author.

Insect and other injuries to potato tubers, G. F. MacLeod and W. A. Rawlins *(Cornell Sta. Bul. 569, 1933, pp. 14, figs. 8).*—The authors describe the injury to potato tubers by wireworms, gnats and millipedes as well as minor injuries caused by flea-beetle larvae, slugs and white grubs. Where wireworms are injurious it is suggested that, if the wheat wireworm is involved, a rotation should be planned which will keep the fields free from dense cover from May 1 to June 15 each year. In the case of millipedes and gnats it was found that marked decreases in the amount of injury caused by these pests were noted where the pH value of the soils was changed from 6.2 to 5.0. No material reductions of injury followed where the pH change was in the region of from 7.0 to 5.5 or above. It is suggested that the soil be tested twice a year, spring and fall, so that a pH of about 5.0 be maintained by the use of sulfur or acid-forming fertilizers.

Irish potato investigations, Julian C. Miller and W. D. Kimbrough *(Louisiana Bul. 239, 1933, pp. 16).*—In tests conducted to determine the value of the various fertilizer ingredients for potatoes, largest yield increases followed the use of nitrogen. In general, however, best results followed the application of a complete fertilizer. Am-

monium sulfate is recommended as a source of nitrogen, superphosphate and muriate of potash as sources of phosphorus and potash respectively. It is recommended that a 4-12-4 or a 4-8-4 be used at the rate of 800 pounds per acre at time of planting, with an additional application of 160 pounds of sulfate of ammonia as a top or side dressing when the plants mark the row. A concentrated mixture was found to be as satisfactory as the standard mixtures, particularly where the soil was rich in organic matter.

It was found that 1.5 ounce seed pieces were best for very early plantings but a one ounce piece is recommended for general planting. Spacing 14 inches in the row was more economical than 12 inches. In general it was found also that potatoes from fall grown seed matured about two weeks later than northern grown certified seed and the yield of the latter was larger than that of the fall, home grown seed.

Produces:

Potatoes that ship better and are less susceptible to bruising, skinning and cracking.

Tubers that are more compact, better developed, thicker, orter and wider. This means that potatoes of a certain weight take up less room in the bin or bag.

7 Potatoes that have a high starch and low protein content. When cooked these potatoes are white, mealy and palatable.

No. 1's

My last crop was hit by two bad hail orms," *says Harry Fraser, of Easton, Me.* e plants were so terribly beaten down I ught the crop was ruined but they quickly overed and averaged 150 barrels per acre a 40-acre field. It takes strong, vigorous ots to make a comeback like that. These the kind 10%-potash fertilizer produces."

I have compared 14 and 20%-potash ilizers at 1000 pounds per acre," *says ter Christie, of Presque Isle, Me.* "The erence in yield alone was more than ugh to pay the entire cost of the fertilizer. e conducting this test on my own land ave used 8-16-20 fertilizer at 1000 nds per acre on all of my potatoes." *r. Christie has 800 acres in potatoes.)*

10%-potash fertilizer produces tops that green longer and a better yield of ers which are smoother, more uniform ize and of far better type," *says Ernest ren, of Mars Hill, Me.*, who specializes he production of high-grade, certified dation stock.

We have been using 10%-potash fertil- for the last 10 years," *say Lewis and rt Callnan, of Hodgdon, Me.*, "and find it produces the kind of potatoes that e the grade, the only kind the grower of e stock gets paid for."

I am convinced by actual experience that -potash fertilizer produces higher yields merchantable potatoes than 7%-potash duces," *says F. C. Soule, of Smyrna Mills,*

"10%-potash fertilizer keeps tops growing longer and produces potatoes more uniform in size, plumper, better rounded out and prettier than does 7%-potash fertilizer. There are far less seconds and a big reduction in culls," *says Ben Ward, of Limestone, Me.*

"I certainly would not be using 10% potash in 1934 unless I was sure that it paid on my farm. It increases the percentage of marketable potatoes," *says Hiram E. Towle, of Fort Fairfield, Me.*

"With 10%-potash fertilizer, potatoes are more even in size and well filled out, smooth and blocky. There are very few seconds and very few throw-outs and culls," *says Mike McLaughlin, of Limestone, Me.*

"For three years I have compared 14% and 20%-potash fertilizers. These tests convinced me that it pays to use 20% potash. Last year the difference in yields, at present potato prices, due to extra potash was enough to pay the entire fertilizer bill," *says Perley A. Ramsdell, of Presque Isle, Me.*

"I have tried out fertilizers with 7% and 10% potash on my farm and found that the slightly higher cost of the higher-potash fertilizer is a good investment for me," *says Roscoe Burtchell, of Fort Fairfield, Me.*

"I have compared 7 and 10%-potash fertilizer and the double-strength 14 and 20% potash fertilizer. With both single and double-strength mixtures the higher potash has given me better yields," *says Ben Marks, of Presque Isle, Me.* Mr. Marks grows from 400 to 500 acres of potatoes each year.

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AN UNFAIR TAX

The potato industry uses approximately seventy million sacks each year. Of these, approximately 99 per cent are made from jute, and 1 per cent or less from cotton. It is estimated that the present tax of $16.00 to $17.00 a thousand on burlap sacks will cost the industry more than one million dollars a year.

The potato growers do not object to paying increased prices for their labor and supplies when they have some assurance that this may help restore the purchasing power of the consumer. They feel, however that the compensating tax on burlap sacks is not likely to accomplish this. Neither can they see how this tax benefits the cotton industry since with the exception of the consumer size package, very few cotton sacks are used for shipping potatoes.

The position of the potato grower at the present time is by no means an enviable one. Increased plantings are reported from all sections of the country. In this connection it is of interest to note that the acreage in the cotton states increased 14.1 per cent as compared with 7.2 per cent for the entire country. Is it possible that acreages formerly planted in cotton are now being planted with potatoes? Now the potato grower is asked to pay a tax on burlap, this tax supposedly to accrue to the benefit of the cotton grower.

The cost of growing an acre of potatoes has increased materially over last year. On certain items the increased cost is probably justified. In other cases, and the advance in the cost of sacks in particular, it is very questionable if these increases are necessary or justifiable. Grower organizations in California, Idaho, New Jersey, as well as in other states are making an effort to have this tax rescinded. These sections should have support in their efforts to remove this added burden to the potato industry.